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SCOUT-CTD

Conductivity-Temperature-Depth (CTD) data collected from the environment of a tagged animal during the deployment period. CTD data are often used to supplement buoy- and/or ship-collected oceanographic data. The SCOUT-CTD is a prototype tag that generates salinity and temperature profiles with corresponding Fastloc® GPS locations. This tag uses a fully-calibrated electrode-based conductivity sensor coupled with a high-resolution temperature thermistor to collect oceanographic profiles on free-ranging marine mammals.

Tags Containing This Data Product
SCOUT-CTD

CTD Profiles

On Wildlife Computers tags, a CTD profile is developed by measuring the external (environmental) temperature and conductivity at pre-determined depths corresponding to either the World Ocean Database 2013 (WOD13) or World Ocean Atlas 1994 (WOA94) depth tables.

There are 68 WOD13 standard depths for a 2000 m tag:

WOD13 Standard Depths for 2000 Meters and Above									
Depth	Level	Depth	Level	Depth	Level	Depth	Level	Depth	Level
0	1	70	15	300	29	800	43	1500	57
5	2	75	16	325	30	850	44	1550	58
10	3	80	17	350	31	900	45	1600	59
15	4	85	18	375	32	950	46	1650	60
20	5	90	19	400	33	1000	47	1700	61
25	6	95	20	425	34	1050	48	1750	62
30	7	100	21	450	35	1100	49	1800	63
35	8	125	22	475	36	1150	50	1850	64
40	9	150	23	500	37	1200	51	1900	65
45	10	175	24	550	38	1250	52	1950	66
50	11	200	25	600	39	1300	53	2000	67
55	12	225	26	650	40	1350	54		
60	13	250	27	700	41	1400	55		
65	14	275	28	750	42	1450	56		

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There are 26 NODC (Levitus) WOA94 standard depths for 2000 m tag:

WOA94 Standard Depths for 2000 Meters and Above									
Depth	**Level**	**Depth**	**Level**	**Depth**	**Level**	**Depth**	**Level**	**Depth**	**Level**
0	1	100	7	400	13	1000	19	1750	25
10	2	125	8	500	14	1100	20	2000	26
20	3	150	9	600	15	1200	21		
30	4	200	10	700	16	1300	22		
50	5	250	11	800	17	1400	23		
75	6	300	12	900	18	1500	24		

The tag is configured with a user-programmable summary period and a minimum dive depth. The tag will store a "profile" from the deepest dive within the summary period. Conductivity, temperature, and depth will be collected every second on selected dive ascents. If a dive descends 10 percent deeper than any previous dive in the current summary period, then all previous data are cleared and new CTD data are collected for the remainder of the current dive. When a summarization period begins, the conductivity sensor is activated when the animal moves past the minimum dive depth and "triggers" the start of the recording. Recording will stop when the tag reads "dry" and then a Fastloc snapshot is taken and the "trigger" depth is increased by ten percent. This cycle will continue until the end of the summary period. When a summary period ends, the tag creates a profile message containing salinity and temperature pairs for each of the encountered depths from the selected depth table (WOD13 or WOA94).

Every profile provides:

- Timestamp when the profile dive **ENDED** (year, month, day, hour).
- Most recent observed salinity in PSU (Practical Salinity Unit) at each depth.
- Most recent observed temperature (° C) at each depth.
- Resolution of each temperature, salinity, and depth value.

A profile may be encoded in multiple messages. Each message contains up to eight salinity and temperature pairs at consecutive depth levels. Each message's min/max PSU and min/max temperature's are encoded to .001 resolution. Encoded PSU can range from 0 to 50, temperature from -3° C to 40° C, and values outside these ranges are clipped to the corresponding boundary. Individual salinity and temperature pair values are encoded as a fraction of the encountered min/max range in units of 1/250 if the difference between the maximum and minumum values exceeds 250, otherwise the actual delta from the minimum value is directly reported.

In the unlikely event the tag "misses" a reading at one of the depths, an alternate "nearest depth" can be used instead. This *nearest depth* must be within 10 percent of the difference between the missing standard depth and the previous standard depth.

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For example, if the tag is configured for WOD13 and the profiled dive goes to 1000 m, but the entry for 500 m is missing, the tag will search 12.5 meters on both sides of the missing 500 m entry for a non-empty entry and uses the nearest depth values found. There is no indication in the message if a *nearest depth* was substituted.

Things to consider: A 1000 m tag configured for WOD13 can generate, at most, six profile messages per summary period, or nine messages for a 2000 m tag. Similarly, WOA94 tags can generate, at most, three messages for a 1000 m tag and four for a 2000 m tag. The tag's message storage can hold, at most, 57 profile messages, so it is important to balance the summary period length and the expected availability of transmission opportunities.

Locations

Scout-CTD is able to record both Argos and Fastloc GPS locations. All locations are transmitted via the Argos Satellite System.